

# REFRIGERANT

## ON-VEHICLE INSPECTION

### 1. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

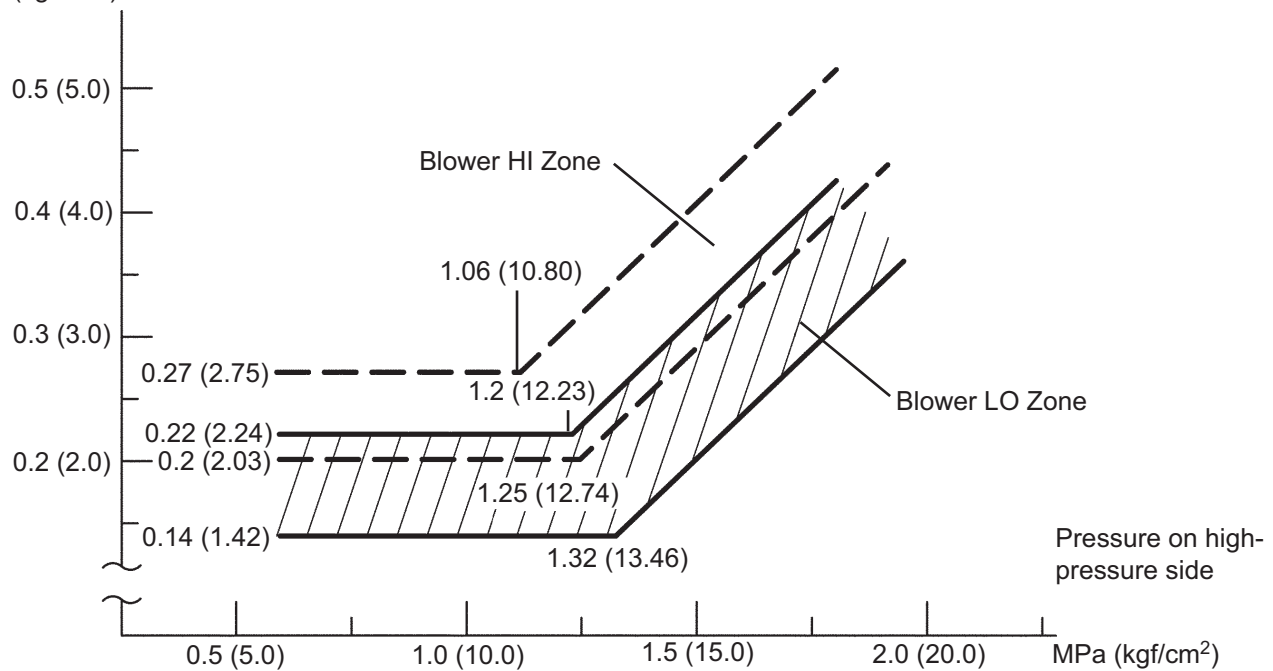
(a) This method uses a manifold gauge set to locate problem areas. Read the manifold gauge pressure when these conditions are established. Test conditions:

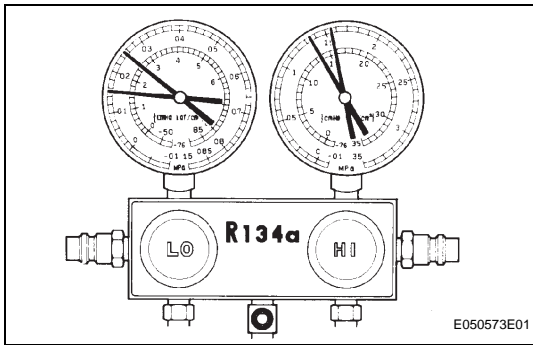
- Temperature at the air inlet is 30 to 35°C (86 to 95°F).
- Engine is running at 1,500 rpm.
- All doors are fully open.
- Blower speed control switch is at HI.
- A/C switch is ON.

Gauge readings (Reference).

Pressure on low-pressure side

MPa (kgf/cm<sup>2</sup>)

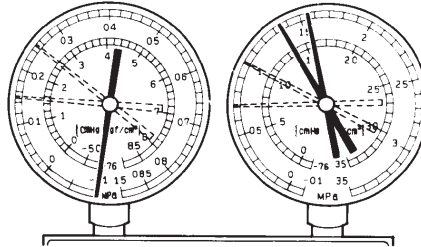




- (1) Normally functioning refrigeration system  
**Gauge reading**

Pressure side	Refrigerant volume
Low	0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm <sup>2</sup> )
High	1.37 to 1.57 MPa (14 to 16 kgf/cm <sup>2</sup> )

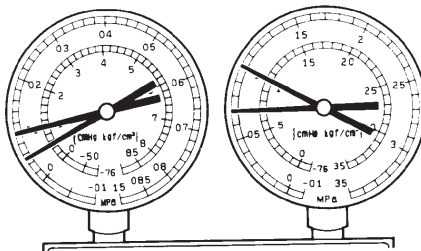
- (2) The A/C system periodically changes between normal and improper function due to moisture in the refrigerant system.



I022117E16

Symptoms	Probable Cause	Diagnosis	Corrective Actions
During operation, pressure on low pressure side cycles between normal and vacuum	Moisture in refrigeration system freezes at expansion valve orifice, causing temporary stop of cycle. However, when melted, normal state is restored.	<ul style="list-style-type: none"> <li>- Drier is overly saturated</li> <li>- Moisture in refrigeration system freezes at expansion valve orifice and blocks refrigerant circulation</li> </ul>	<ol style="list-style-type: none"> <li>1. Replace cooler drier</li> <li>2. Remove moisture from cycle by repeatedly evacuating air</li> <li>3. Supply appropriate volume of new refrigerant</li> </ol>

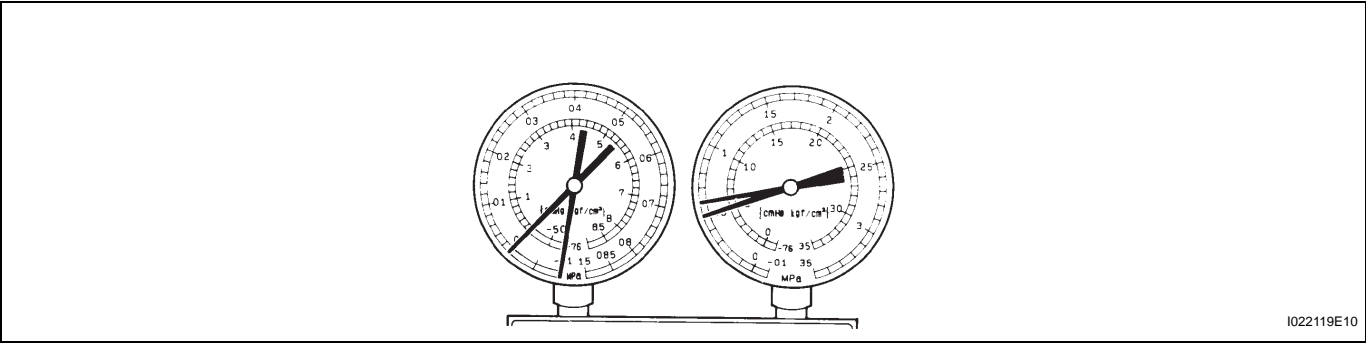
- (3) The A/C system does not function effectively due to insufficient cooling.



I022118E09

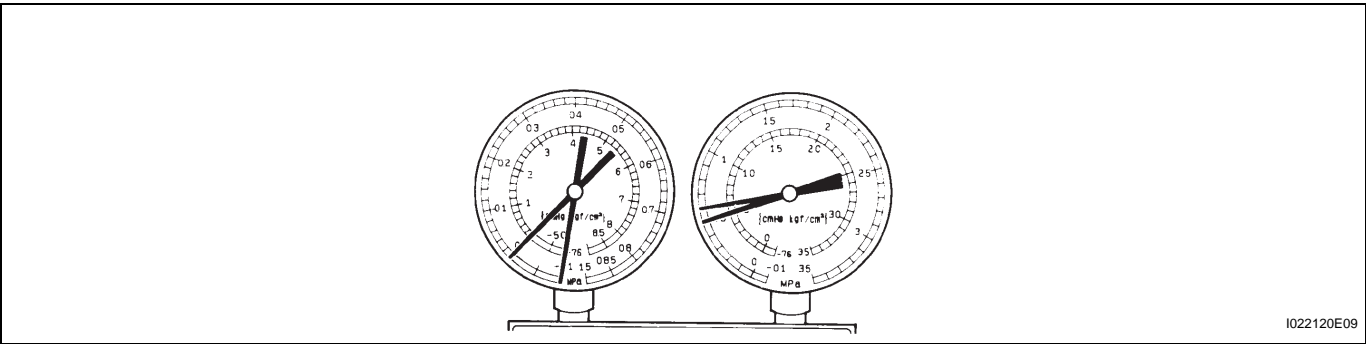
Symptoms	Probable Cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> <li>- Pressure low on both low and high pressure sides</li> <li>- Cooling performance insufficient</li> </ul>	Gas leakage from refrigeration system	<ul style="list-style-type: none"> <li>- Insufficient refrigerant</li> <li>- Refrigerant leakage</li> </ul>	<ol style="list-style-type: none"> <li>1. Check for gas leakage and repair if necessary</li> <li>2. Supply appropriate volume of new refrigerant</li> <li>3. If indicated pressure value close to 0 when connected to gauge, create vacuum after inspecting and repairing the location of leakage</li> </ol>

(4) The A/C system does not function effectively due to poor circulation of the refrigerant.



Symptoms	Probable Cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"><li>- Pressure low on both low and high pressure sides</li><li>- Frost exists on piping from condenser to A/C unit</li></ul>	Refrigerant flow obstructed by dirt in condenser	Condenser clogged	Replace condenser

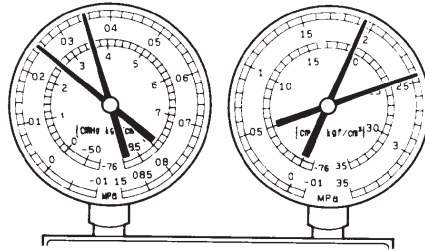
(5) The A/C system does not function intermittently because the refrigerant does not circulate.



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Symptoms	Probable Cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"><li>- Vacuum indicated on low pressure side, and extremely low pressure indicated on high pressure side</li><li>- Frost or condensation seen on piping on both sides of condenser or expansion valve</li></ul>	<ul style="list-style-type: none"><li>- Refrigerant flow obstructed by moisture or dirt in refrigeration system</li><li>- Refrigerant flow obstructed by gas leakage from expansion valve</li></ul>	Refrigerant does not circulate	<ol style="list-style-type: none"><li>1. Check expansion valve refrigerant</li><li>2. Clean expansion valve by blowing air</li><li>3. Replace condenser</li><li>4. Evacuate air and charge appropriate volume of new refrigerant</li><li>5. For gas leakage from expansion valve, replace expansion valve</li></ol>

- (6) The A/C system does not function effectively due to overcharged refrigerant or insufficient cooling of the condenser.



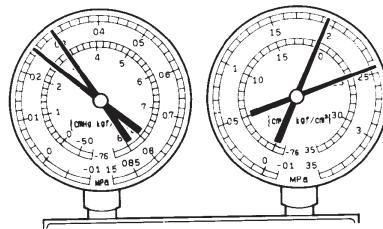
I022121E10

Symptoms	Probable Cause	Diagnosis	Corrective Actions
Pressure extremely high on both low and high-pressure sides	<ul style="list-style-type: none"> <li>- Excessive refrigerant</li> <li>- Cooling performance of condenser insufficient</li> </ul>	<ul style="list-style-type: none"> <li>- Condenser is dirty</li> <li>- Condenser fan motor is malfunctioning</li> <li>- Excessive refrigerant</li> </ul>	<ol style="list-style-type: none"> <li>1. Clean condenser</li> <li>2. Check condenser fan motor operation</li> <li>3. If 1 and 2 normal, check the amount of refrigerant and supply appropriate volume of refrigerant</li> </ol>

- (7) The A/C system does not function due to air in the refrigeration system.

**CAUTION:**

**The low-pressure piping may be very hot and cause serious burns.**

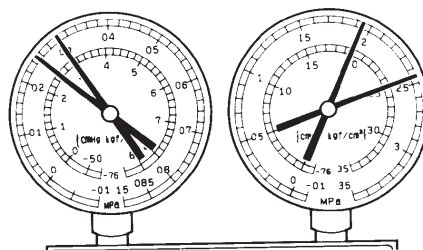


HINT: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging

I022122E03

Symptoms	Probable Cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> <li>- Pressure extremely high on both low and high-pressure sides</li> <li>- Low-pressure piping is too hot to touch</li> </ul>	Air in refrigeration system	<ul style="list-style-type: none"> <li>- Air in refrigeration system</li> <li>- Vacuum purging insufficient</li> </ul>	<ol style="list-style-type: none"> <li>1. Check if compressor oil is dirty or insufficient</li> <li>2. Evacuate air and charge new refrigerant</li> </ol>

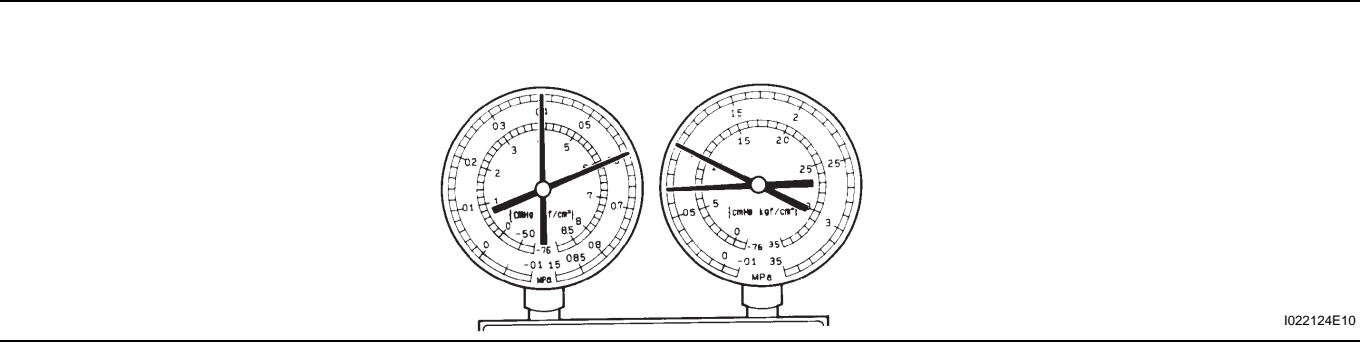
- (8) The A/C system does not function effectively due to an expansion valve malfunction.



I022123E11

Symptoms	Probable Cause	Diagnosis	Corrective Actions
<div>- Pressure extremely high on both low and high-pressure sides</div> <div>- Frost or condensation on piping on low-pressure side</div>	Problem with expansion valve	<div>- Excessive refrigerant in low pressure piping</div> <div>- Expansion valve too wide open</div>	Replace expansion valve

(9) The A/C system does not function due to a defective compressor.



Symptoms	Probable Cause	Diagnosis	Corrective Actions
<div>- Pressure extremely high on both low and high-pressure sides</div> <div>- Pressure extremely low on high pressure side</div>	Internal leakage in compressor	<div>- Compression failure</div> <div>- Leakage from damaged valve or broken sliding parts</div>	Repair or replace compressor

## REPLACEMENT

### 1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

- Start up the engine.
- Turn the A/C switch ON.
- Operate the cooler compressor with an engine speed of approximately 1,000 rpm for 5 to 6 minutes to circulate the refrigerant and collect the compressor oil remaining in each component into the cooler compressor.
- Stop the engine.
- Using SST, discharge the refrigerant gas.

**SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)**

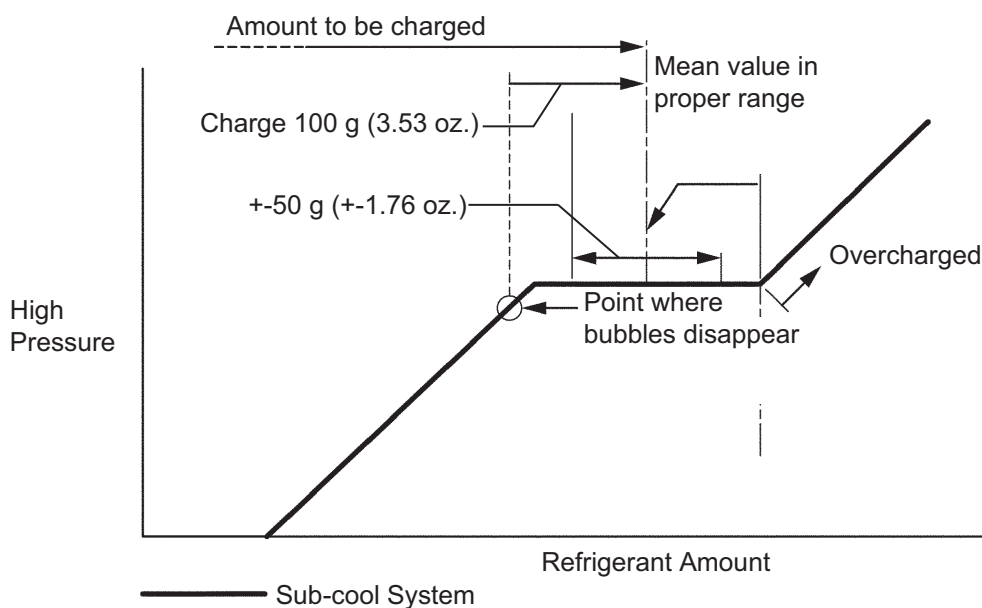
### 2. CHARGE REFRIGERANT

- Perform vacuum purging using a vacuum pump.
- Charge refrigerant HFC-134a (R134a).

**Standard:**

**430  $\pm$  30 g (15.2  $\pm$  1.1 oz.)**

**SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)**



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I037365E02

#### NOTICE:

- Do not operate the cooler compressor before charging refrigerant as the cooler compressor will not work properly without any refrigerant, and will overheat.

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- Approximately 100 g (3.53 oz.) of refrigerant may need to be charged after bubbles disappear. The refrigerant amount should be checked by measuring its quantity, and not with the sight glass.

### 3. WARM UP ENGINE

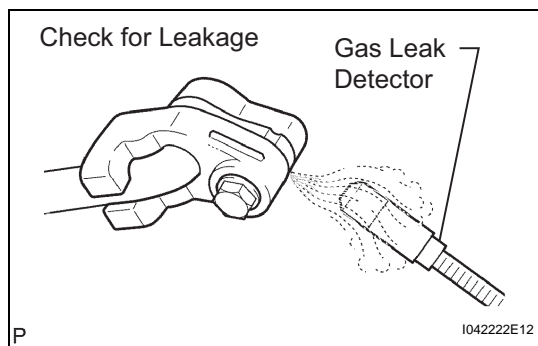
- (a) Warm up the engine at less than 1,850 rpm for 2 minutes or more after charging the refrigerant.

**NOTICE:**

**Be sure to warm up the compressor when turning the A/C switch ON after removing and installing the cooler refrigerant lines (including the compressor), to prevent damage to the compressor.**

### 4. CHECK FOR LEAKAGE OF REFRIGERANT

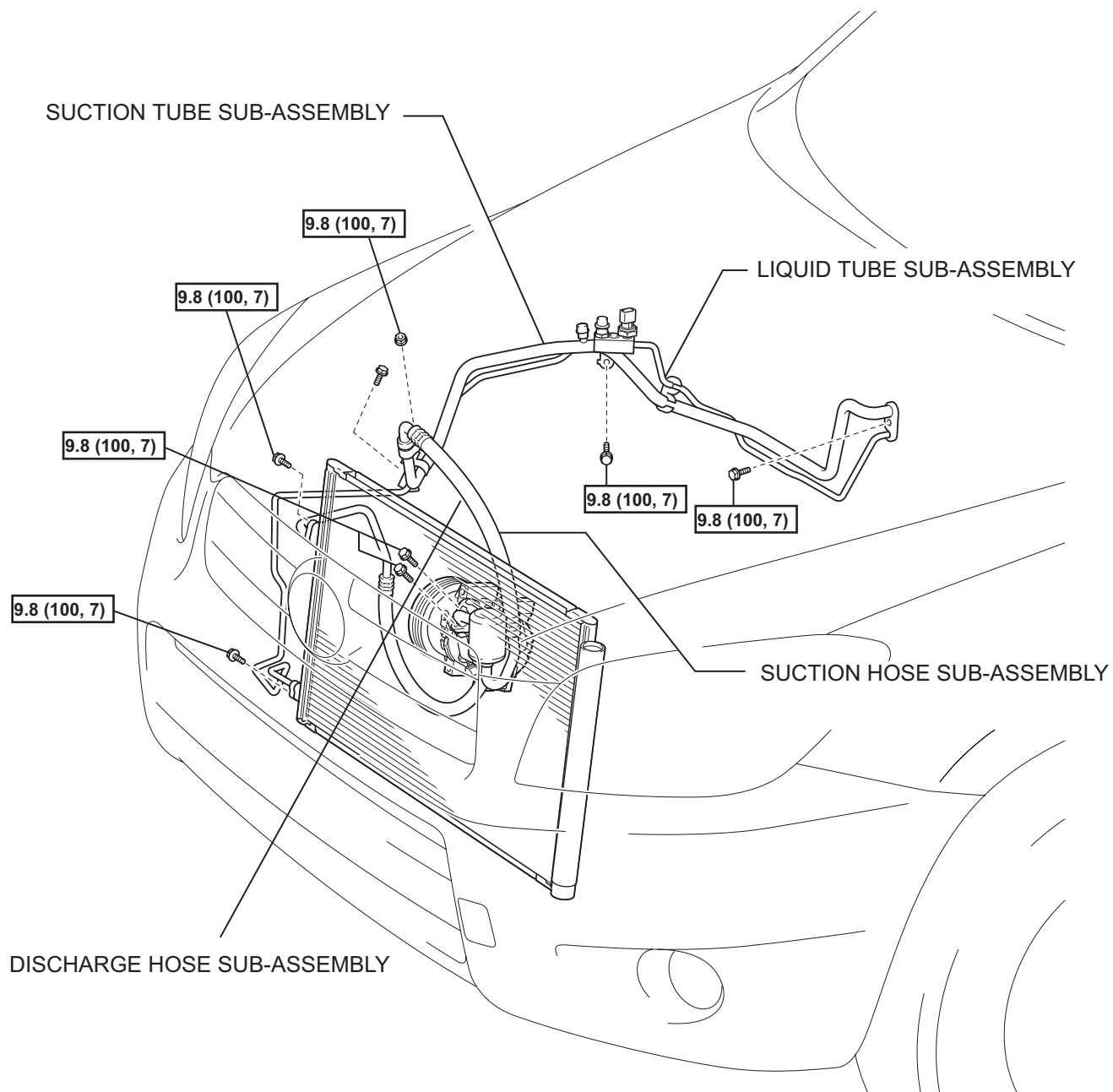
- (a) After recharging the refrigerant gas, check for refrigerant gas leakage using a halogen leak detector.
- (b) Perform the operation under these conditions:
- Stop the engine.
  - Secure good ventilation (the gas leak detector may react to volatile gases other than refrigerant, such as evaporated gasoline or exhaust gas).
  - Repeat the test 2 or 3 times.
  - Make sure that some refrigerant remains in the refrigeration system. When compressor is off: approximately 392 to 588 kPa (4 to 6 kgf/cm<sup>2</sup>, 57 to 85 psi)
- (c) Using a gas leak detector, check the refrigerant line for leakage.
- (d) If a gas leak is not detected on the drain hose, remove the blower motor control (blower resistor) from the cooling unit. Insert the gas leak detector sensor into the unit and perform the test.
- (e) Disconnect the connector and leave the pressure switch on for approximately 20 minutes. Bring the gas leak detector close to the pressure switch and perform the test.



# REFRIGERANT LINE

## COMPONENTS

(2005/11-2006/01)



AC

**9.8 (100, 7)** : Specified torque



COMPONENTS

(2006/01- )

for 2AZ-FE

SUCTION TUBE SUB-ASSEMBLY

9.8 (100, 7)

9.8 (100, 7)

9.8 (100, 7)

9.8 (100, 7)

LIQUID TUBE SUB-ASSEMBLY

9.8 (100, 7)

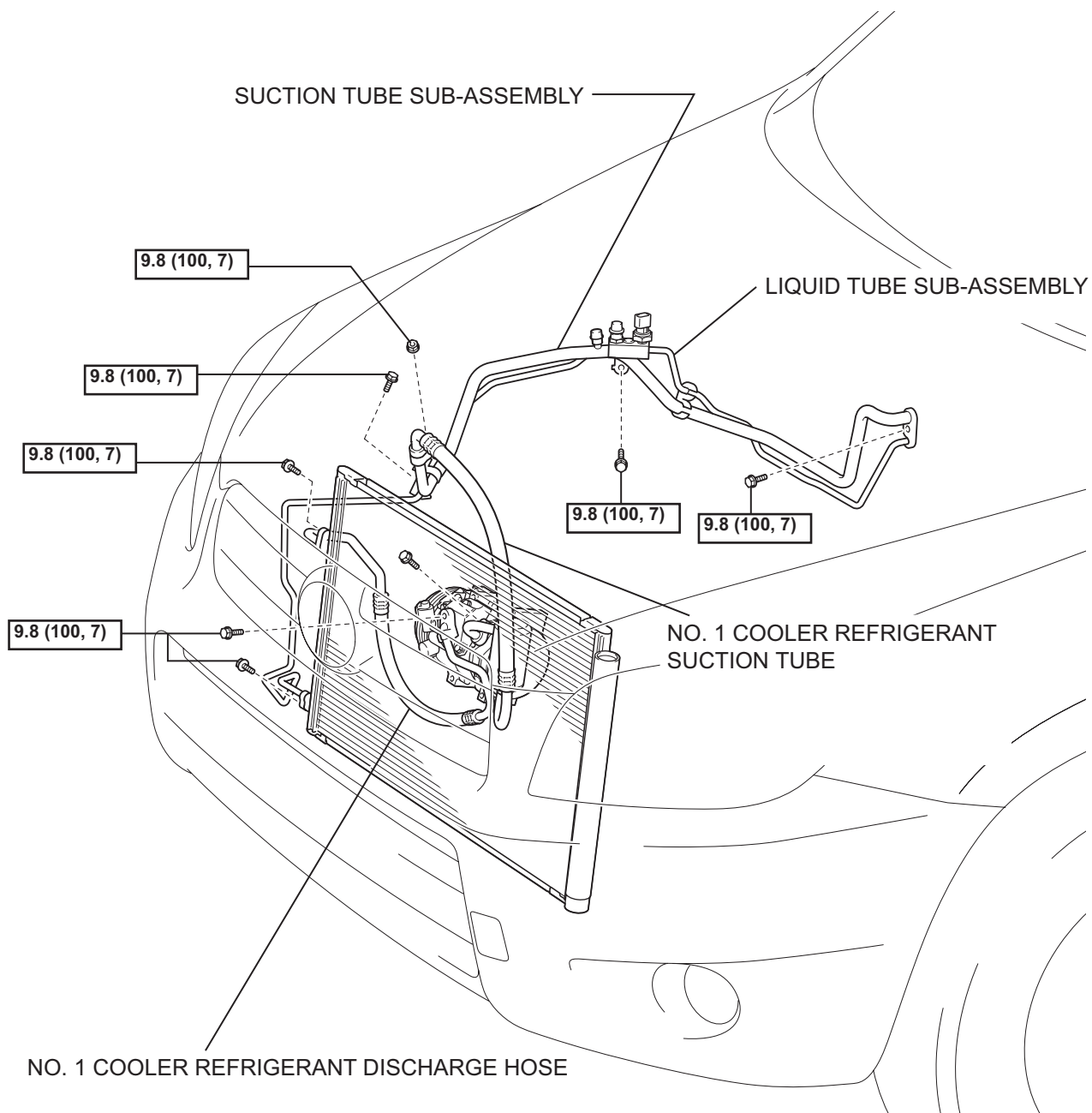
9.8 (100, 7)

SUCTION HOSE SUB-ASSEMBLY

DISCHARGE HOSE SUB-ASSEMBLY

N\*m (kgf\*cm, ft.\*lbf) : Specified torque

for 2GR-FE



$\boxed{\text{N}^*\text{m (kgf}^*\text{cm, ft.}^*\text{lbf)}}$  : Specified torque

AC